alphaNUCLEAR

REQ. NO.3-9145

CONTRACT REPORT NO. ORJ 83-00209

Model 610 alphaLOGGER
Data Mass Storage System

OPERATORS MANUAL

OCT 26 1984
MICROMEDIA

51 pp

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Model 610 alphaLOGGER
Data Mass Storage System

GENERAL

The model 610 non-volatile mass storage memory system is supplied as an accessory device for use with the model 600 alphaLOGGER system. In application, the memory modules allow non-volatile digital storage of all the data printed by the alphaLOGGER's built-in thermal printer. The recorded data can subsequently be played back into a printer and/or terminal, or into a computer for data processing, compilation, and presentation, as directed by the users computer programme.

As the model 610 memory module is not weather proof, it is recommended that it be deployed attached to the inside of the alphaLOGGER's hinged enclosure lid, this deployment will ensure the unit is protected from the elements, and any unauthorized tampering (the alphaLOGGER's lid can be locked.) To facilitate such deployment, the alphaLOGGER must be returned to alphaNUCLEAR Company for appropriate modifications to provide the memory module power requirements, communications, and facilities to switch OFF (and on) the integral printer. Alternatively the memory module could be deployed external to the alphaLOGGER, connected to the external panel mounted RS-232 connector. This use would assume a relatively clean and certainly dry environment.

A typical model 610 non-volatile mass storage system is comprised of two memory modules, one AC line power supply/interface, and a Logger interconnect cable (attached to Logger panel). In a typical field application, one memory module would be deployed with the alphaLOGGER, while the second would be at a computer site for data play back and processing. Then, prior to the field recording unit reaching its maximum data capacity, the read out unit would be erased and interchanged for the field unit, and so on. Thus there can be an uninterrupted sequence of data being retrieved from the field. The AC line power supply/interface is used at the data playback site to provide power to the unit during this function, and to allow interconnection with a computer and/or readout device.

DESCRIPTION

The model 610 systems memory modules are each able to provide non-volatile storage of 128,000 ASCII characters. This storage capacity translates into 20 days of recording capacity from an alphaLOGGER operating on hourly acquisition cycles, and with a full compliment of sensors attached.

Each memory module incorporates the Intel 1 million bit bubble memory device as the non-volatile mass storage medium. The bubble memory unit operates under the control of a CMOS microprocessor (NSC 800). During most the long term recording mode of operation the bubble memory unit is powered down (in standby) and the

microprocessor is in a sleep mode to conserve power. The alphaLOGGER sends data each preset acquisition interval, at this time the microprocessor becomes active and powers-up the bubble memory unit. Data is received by the microprocessor over the RS-232 communications link with the alphaLOGGER, and writes this data into the bubble memory device. Shortly after cessation of the data transmission the unit again returns to the low power standby state, awaiting the next transmission. During the Playback mode of operation the system is in a fully active condition for the entire function, here power conservation is unnecessary as the memory module is powered from the AC line power supply/interface unit. Playback may be facilitated with many common serial communication devices, such as, video display terminals (VDT) and/or printers directly, or with the aid of a computer. Data received by a VDT and printer directly, will present it exactly as it would be printed on the alphaLOGGER's printer, this method of playback can be VDT keyboard requested one line at a time, a block of X lines at a time, or as a continuous flow (manually interruptible) until the end of the data file. This assumes the VDT/printer can follow the factory set baud rate of 4800.

The more likely and useful playback method would be with a typical personal type computer. With this facility the user can control and manipulate the data as desired through a high level language software programme. Under such a user designed and generated programme, any special requirements of data processing and presentation can be realized. Likewise, the contents of the

memory module could be written into a floppy disc for later processing, and the erased memory module returned to recording service.

Modified alphaLOGGERs include a switch located on the instrument panel beside the memory module interconnect cable bushing. This switch allows the alphaLOGGERs printer to be switched OFF, thus conserving power and printer paper. The memory module effectively renders the printer redundant, except for alphaLOGGER set-up procedures.

OPERATION - GENERAL

The model 610 memory module incorporates a minimum of external manual controls and status indicators. To simplfy operation of the unit, many other system status checking and control functions are performed automatically under internal software control.

Included on the exterior panel are the following items:

ON-OFF switch (power)
Data PLAYBACK - RECord switch
PLAYBACK indicator
MEMory/ACTive indicator
Systems power Fuse (2 Amp)
Connector receptacle (power and data I/O)

The ON-OFF switch simply turns on or off the externally supplied 24 volts (nominal) DC power. This power is supplied through the connector receptacle from the alphaLOGGER when recording data, and from the computer site located power supply/interface when in playback operation. The purpose of this power switch is to turn OFF the unit prior to connection or disconnection of the Power/Data I/O plug and or alphaLOGGER or any playback device connector.

The data PLAYBACK-RECord switch is used to select the mode of operation desired.

The PLAYBACK indicator will illuminate in a static condition along with the MEM/ACT (memory active) indicator when the PLAYBACK-REC switch is in the playback position. This indicates the system is active and ready in the playback mode.

The PLAYBACK indicator is also used to show that the memory module is in the correct condition for switching OFF, prior to disconnection from the alphaLOGGER. This condition is shown by the indicator flashing on and off.

OPERATION - PLAYBACK

Each memory module supplied with the 610 system contains two record blocks of alphaLOGGER data in memory. This is included to help the initial user become familiar with the playback operation.

The prerecorded data blocks are as follows, but TIME, DATE, BAT and the AD data will likely vary from that shown.

Data Block

```
*START
TIME      42
DATE       0

TIME     100
DATE       0

AM 1 110091
AM 2 110091
AM 3 110091
AM 4 110091
AM 5 110091
AM 6 110091
AM 8 110091
AM 9 110091
AM10 110091
AM12 110091

AD 1    04.0
AD 2    04.1
AD 3    04.0
AD 4    04.0
AD 5    04.0
AD 6    04.0
BAT     22.0

Data block repeated, followed by;

*END
```

The playback procedures of this manual is based on the use of a standard VDT set to receive data at 4800 baud, an appropriate printer could be attached to the auxillary out of the VDT to provide simultaneous hard copy of the playback. Likewise, a computer programmer could incorporate the various command characters into a programme to also perform the basic playback.

1. Plug the Power Supply/Interface into an AC power outlet.
2. Install the standard 25 pin "DB" type computer connector into the RS-232 recptacle of the VDT, switch on VDT power and clear screen.
3. Set the PLAYBACK-REC switch to the PLAYBACK position and the ON-OFF switch to the OFF position.
4. Connect the circular twist lock connector to the receptacle on the memory module.
5. Turn ON power switch. The MEMory/ACTive indicator and the PLAYBACK indicator will illuminate.
6. At this time the memory module will transmit a colon (:) to the VDT, this colon should be displayed beside the cursor in the upper left portion on the video screen.
   This colon indicates that the memory module is ready to playback and is communicating with the VDT. Also at this time a software data pointer is set to the beginning of the data file.
7. Assuming the foregoing has been achieved, key in P then A on the VDT keyboard. This command will be echoed back to the VDT and then cause all the data in the memory module to be displayed, in this case this data is the two prerecorded data blocks. Upon completion of the playback the words "END OF FILE" will be displayed following the data.
8. Key in R then depress the Return Key, this command is echoed back and returns the data pointer to the beginning of the file again. The VDT will acknowledge this command with "OK" followed on the next line with the colon ":".

The foregoing proves the system is operational and all communications are satisfactory.

The additional commands available for playback are as follows, after execution of all commands the colon ":" is transmitted, confirming the memory module is ready for next command.

P Return — The P command used alone causes the next available line to be sent from the memory module and displayed. This command is echoed back.

Pn Return — P followed by a number (n) will cause the next n lines to be displayed (n = 1-9999). This command is echoed back.

Sn Return — S followed by a number (n) will cause the next n lines to be passed over, skipped (n = 1-9999). Acknowledgement is OK.

eg. enter R return. P6 return. S9 return. P return. The display will be showing the AM10 data, 110091. This command is echoed back.

CTRL S — After a P A or Pn command it may be desirable to cause the playback to pause. Depress the CTRL and S keys simultaneously to effect the pause.

CTRL Q — This command will allow the data playback to resume. Depress the CTRL and Q key simultaneously.

CTRL C — This control function, used after a CTRL S command only, will cause the current line to be transmitted and the original P command to be cancelled.

B Return — This command displays how many "K" (thousands) bytes of memory remain from the current position of the data pointer. If it is desired to see how much unused or available memory is left, key in S 9999 (skip 9999 lines). This, in most cases will place the data pointer at the end of the file, the display will show "END OF FILE". Now the B command can be used to see how much available memory remains. This command is echoed back.

The two remaining commands available should be used with **CAUTION** as they will cause partial or total erasure of any data in the memory module.

E Return — This command causes the end-of-file mark to be placed at the current location of the data pointer. If the data pointer should be at any location other than the end of the file, all data in higher order locations in the file will no longer be addressable. After entry of this command the system will respond with the message, **"ERASE MEMORY...ARE YOU SURE? Y/N"** If it is desired to abort this command, key in N Return (no). Otherwise key in Y Return (yes) and the command will be executed. This command is mainly used to erase the entire memory module. This is performed by entering R then Return (set data pointer to beginning of file) then E followed by return, and responding to the prompt messeage with a Y Return. This command is echoed back.

ESC T — The Escape (ESC) key followed by a T will initiate a test mode of operation. As data stored in the memory will be destroyed upon

execution of this command, a verification prompt messeage is issued. **"MEMORY TEST...ARE YOU SURE? (Y/N)"**. If the user response is Y (yes), the message **"WRITING DATA"** appears, and the entire memory is written full of E O F (end of file) marks. This process takes about 3.5 minutes. After which the memory is automatically read back and checked for hard errors. This takes another minute, with a **"READING DATA"** message issued. After completion the message **"TEST FINISHED"** followed on the next line with **"OK"** if the memory is sound. If a memory fault is found, an error message is issued.

It is good practice to always ensure the power ON-OFF switch is in the OFF position before connecting or disconnecting a memory module from any playback device. This will help ensure the integrity of data stored in memory.

ERROR MESSAGES

"SN ERR" Means an invalid command was keyed in, syntax error. After reappearance of the colon (:), enter a valid command.

"BUBBLE WILL NOT INITIALIZE"

This error message indicates a fault of the bubble memory unit. If however the colon (:) appears on the VDT, ignore this message. Otherwise, switch the ON-OFF switch to OFF, wait 10 seconds and switch ON again, if the message persists and no colon appears the unit will need repairs.

"READ ERROR" This indicates a nonrecoverable hard error, likely a fault of the bubble memory unit or its support circuitry. Prior to this message the system has attempted a second read, as it can correct for soft errors automatically.

"WRITE ERROR" This indicates a hard error also. This would show if a problem was encountered during the test mode, ESC T. In the normal course of recording data, the system

automatically reads after writing to check the validity of all stored data. This message would appear after a second attempt to write (and read) the data had failed.

OPERATION-RECORDING DATA

Prior to installing the memory module in the alphaLOGGER check that the ON-OFF switch is in the OFF position, and the PLAYBACK-RECord switch is in the REC position.

Attach the circular twist lock connector of an active alphaLOGGER to the mating connector of the memory module, switch the ON-OFF switch to ON.

The MEMory/ACTive indicator only will illuminate for between 10 and 70 seconds, depending on the amount of data resident in the unit's memory, during this period the system is initialized and looking for the end of any existing record file. After which the indicator will go off.

The system will now record any data transmitted by the alphaLOGGER whether the alphaLOGGER's printer is switched ON or OFF. The MEM/ACT indicator will illuminate for each interval data is transmitted from the alphaLOGGER.

To remove a memory module from the alphaLOGGER it is important to

first place the PLAYBACK-REC switch into the PLAYBACK position. The memory active indicator will illuminate momentarily as data in the units buffer is written into non-volatile storage. Following this, the PLAYBACK indicator will start flashing on and off.

This procedure will ensure that recent, volatile buffer stored data (up to 64 characters) is properly saved.

The ON-OFF (power) switch is next switched to OFF prior to the circular twist lock plug being removed.

RECORDING TIME DETERMINATION

To determine the number of days (24 hrs) of recording available on an empty or erased memory module use the following;

(a) (nAM x 12 + 26)x nRec. per day = number of alphaMETER characters per day

(b) plus 97 x nRec. per day = number of analogue device characters per day when printed at same time as alphaMETER data

(c) plus (if applicable) 122 x nRec. per day = additional analogue device characters per day when printed alone (b plus date and time characters)

eg 1 (a) 12 alphaMETERs read hourly

(12 x 12 + 26)x 24 = 4080 AM characters per day

(b) analogue devices read each 30 minutes, this means 24 reading: will be at same time as alphaMETERs and 24 separately.

97 x 24 = 2328 characters

(c) + 122 x 24 = 2928 characters

(d) Total number of characters per day

= 4080 + 2328 + 2928 = 9336

(e) 128000/9336 = 13.7 days capacity

allow a margin, 13 days maximum.

eg 2 (a) 12 alphaMETERs read hourly = 4080

(b) analogue devices read hourly

97 x 24 = 2328

(c) -

(d) Total 6408 characters per day

(e) 128000/6408 = 19.9 days recording capacity

allow a margin, 19 days maximum

SPECIFICATIONS

Operate temperature	$0^{\circ}C$ to $55^{\circ}C$ ($-20^{\circ}C$ to $70^{\circ}C$ optional)
Data storage temperature	$-20^{\circ}C$ to $75^{\circ}C$
Data Capacity	128 K ASCII characters (1 Mbit)
Power	18 to 28 VDC 6 ma standby 350 ma active
Communications	RS-232, full duplex, no parity, 8 bit words, transmits two stop bits, transmits one start bit, 4800 baud standard, other on request.

DB25 connector pin connections

- Pin 1.... Chassis Ground
- Pin 2.... Data to memory (receive)
- Pin 3.... Data from memory (transmit)
- Pin 7.... Signal Ground

ABBREVIATED OPERATING PROCEDURE

Recording

1. Power ON-OFF switch set OFF
2. PLAYBACK-REC switch set to REC.
3. Plug onto an active alphaLOGGER
4. Switch power ON-OFF switch to ON

   The MEM/ACT indicator only will illuminate momentarily. The system will now record any transmission from the alphaLOGGER, the MEM/ACT indicator will illuminate for the duration of each transmission.

Removing from alphaLOGGER

1. Set PLAYBACK-REC switch to PLAYBACK, the MEM/ACT indicator will illuminate momentarily. Next, the PLAYBACK indicator will start flashing on and off.
2. Switch the power ON-OFF switch to the OFF position.
3. Disconnect memory module from alphaLOGGER.

Data Playback

1. Plug Power Supply/Interface into a live AC line outlet.
2. Install the RS-232 25 pin standard connector of the Power Supply/Interface in the proper receptacle of your playback device and power up playback device.
3. Set the PLAYBACK-REC switch to PLAYBACK.
4. Set the power ON-OFF switch to OFF.
5. Connect the circular twist lock connector of the Power/Supply Interface to the receptacle of the memory module.
6. Set memory module power ON-OFF switch to ON. Both indicators will illuminate, and a colon (:) is sent to the playback device.
7. Issue the command/s for desired mode of playback.

Memory Module Erase

After playback is complete it is likely the user would desire to erase the memory prior to returning the unit to field service.
Procedure:

1. Enter command R then Return,
   acknowledgement is "OK"
2. Enter command E then Return,
   system response is "ARE YOU SURE? Y/N"

3. Enter Y then return.
   response is "128K BYTES REMAINING"
4. Switch power ON-OFF switch to OFF prior to disconnection from the playback devices.

ABBREVIATED COMMAND TABLE

Command	Function
P A	Transmit all data.
P return	Transmit next line only.
Pn return	Transmit next n lines only (n = 1 - 9999).
Sn return	Skip over next n lines (n = 1 - 9999).
R return	Return data pointer to start of data file (Rewind).
CTRL S	Stop further transmission.
CTRL Q	Resume transmission, used following CTRL S.
CTRL C	Transmit current line then stop and abort original P command. Used after CTRL S only.
B return	Displays amount of memory from current position of data pointer. When data pointer is at end of file position

	displays amount of memory available.
E return	Place and END OF FILE mark at current position of data pointer. When data pointer is at start of data file this command will ERASE entire memory.
ESC T	This command will initiate a memory test routine. **CAUTION**, execution of this command will destroy any data in memory.